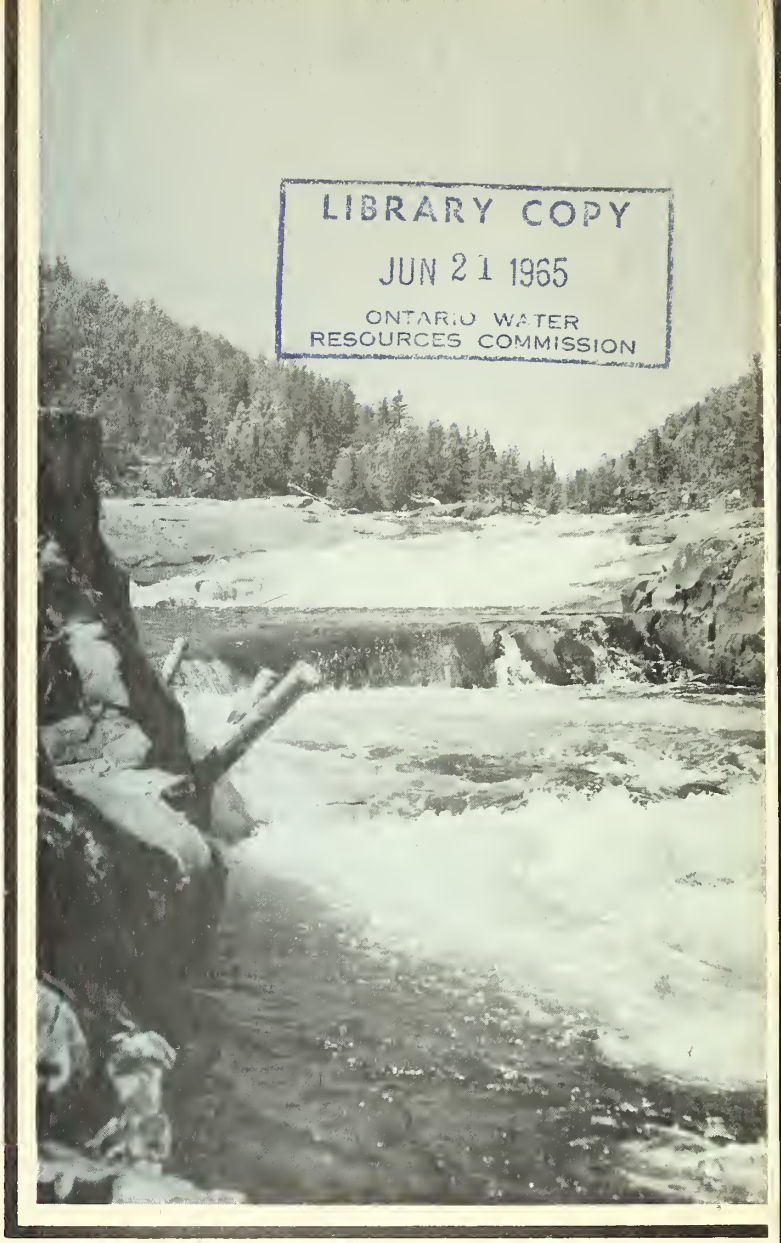
ONTARIO MINISTRY OF ENVIRONMENT
3693600002426?

Richmond Hill Sewage Treatment Plant



LIBRARY COPY
JUN 21 1965
ONTARIO WATER
RESOURCES COMMISSION

1963 Annual Report

TD
367
.A56
R53
1963
MOE

Ontario Water Resources Commission

TD
367
.A56
R53
1963

Richmond Hill : sewage
treatment plant.
81846

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Town of Richmond Hill.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Richmond Hill Sewage Treatment Plant, OWRC Project No. 57-S-6, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

D. S. Caverly,
General Manager

Digitized by the Internet Archive
in 2015

https://archive.org/details/richmondhillsewa24267

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Richmond Hill Sewage Treatment Plant, OWRC Project No. 57-S-6 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer,
Director,
Division of Plant Operations

foreword

This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, have given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.

B. C. Palmer,
Director,
Division of Plant Operations

DIVISION OF PLANT OPERATIONS

contents

Foreword..... Page 1

View of Plant..... Page 2

History..... Page 3

Project Staff..... Page 4

Description of Project..... Page 5

Design Data..... Page 7

Plant Flow Chart..... Page 9

Process Data..... Page 10

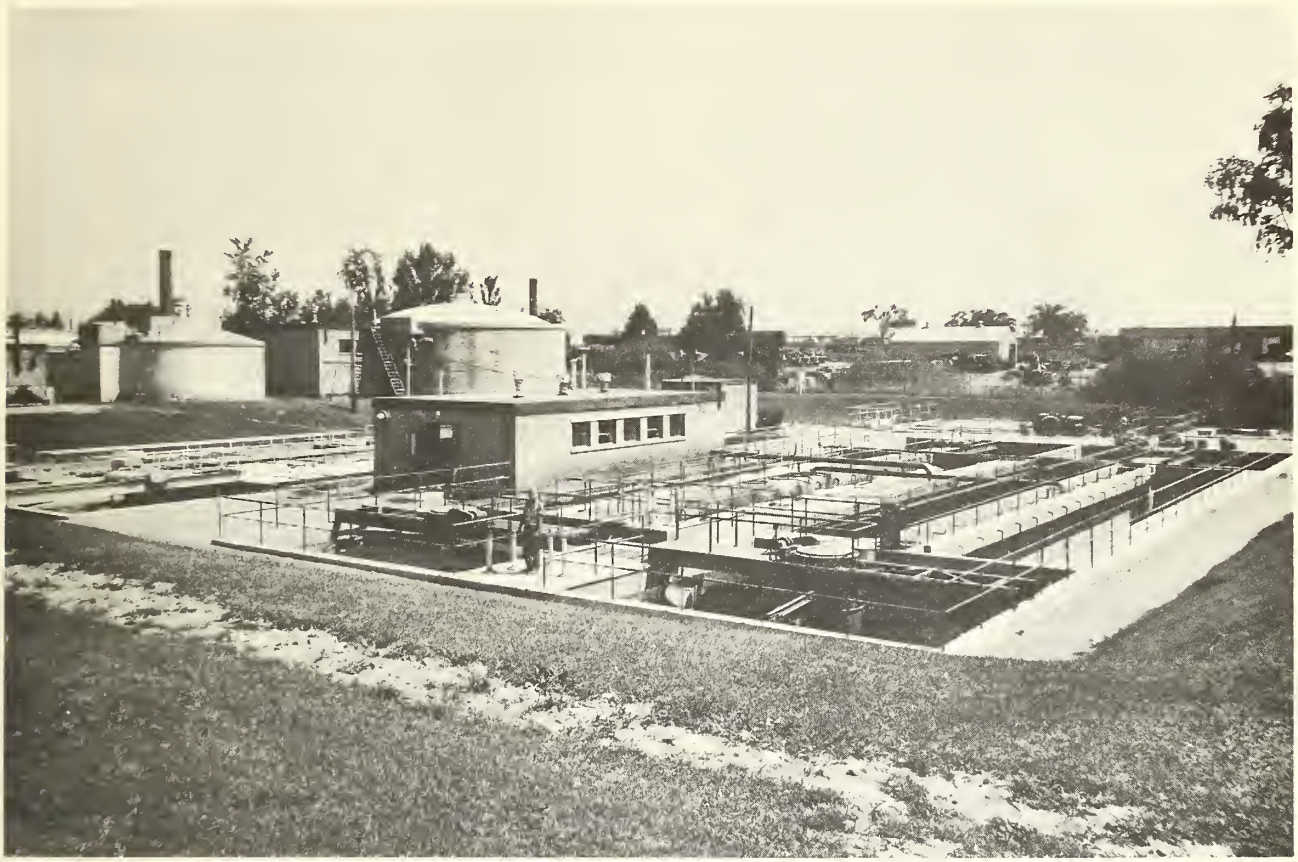
Operating Costs..... Page 20

Summary..... Page 23

Total Costs.....Inside back cover

C. W. Perry
Assistant Director
A. C. Beattie
Regional Supervisor
A. Clark
Operations Engineer

RICHMOND HILL SEWAGE TREATMENT PLANT



OPERATED FOR

THE TOWN OF RICHMOND HILL

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q. C.
J. H. H. Root, M.P.P.
J. A. Vance, LL. D.
A. A. Wishart, Q. C., M.P.P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert
L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1951 to 1963 History

The present plant consists of three activated sludge treatment units in parallel and a common influent works. These three sections were completed in three separate stages. The first stage consisted of a primary sedimentation tank, aeration tanks, secondary sedimentation tank digester and sludge drying beds. This original plant was rated at 180,000 gallons per day and was completed in 1951. The second stage was completed in 1956 and represented an increase in the treatment capacity of 450,000 gallons per day.

The final addition to the plant was completed in 1958. At this time, an additional digester was added as well as an extension to the sludge drying beds. The plant is now able to employ two stage digestion. This extension increased the capacity of the sewage treatment plant by 970,000 gallons per day, and included the building of an influent works which serves each of the three sections. The influent works consists of coarse screens, an aerated grit chamber and a barminutor. From there the sewage flow is split between the three sections. Any one section can be bypassed by closing a gate on the inlet to the primary sedimentation tank of that section.

The two extensions to the plant over the relatively short period since 1951 have resulted from a rapid increase in population over the past twelve years. The design population for the 1951 plant was 3,000 people. The two following design populations were 6,000 and 16,350.

The present plant is now capable of giving complete treatment to 1,600,000 gallons of sewage per day.

Project Staff

S. Toye,
Chief Operator

S. Toye, the Chief Operator at the Richmond Hill plant, joined the OWRC staff as an operator at the North Bay plant. In September 1961, he transferred to the Richmond Hill plant. Mr. Toye has proved to be an efficient and conscientious employee.

Other staff members and the starting date of their employment are:

T. C. Hawkes, Operator	September 1958
G. Golding, Operator	October 1958
R. H. Dennis, Operator	March 1960

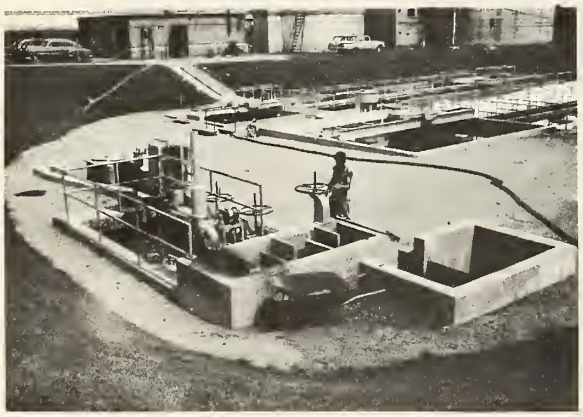
Description of Project

INFLUENT

The waste water enters the plant by means of three sewers - two eight inch diameter sewers along Markham Road and one eighteen inch diameter sewer from Pugsley Avenue.

The raw sewage first passes through a coarse bar screen to remove large objects and then flows to an aerated grit chamber where the velocity of flow is reduced sufficiently to allow grit and detritus material, which may damage plant machinery, to settle out. The air introduced in the chamber produces a roll which allows grit to settle out while keeping the organic material in suspension.

From the grit chamber the flow passes through a barminutor which screens and shreds the large particles to a size suitable for handling in the treatment units. From this point, the flow enters a flow division box where it may be proportioned among the four primary sedimentation tanks.



PRIMARY SEDIMENTATION

The primary sedimentation tanks are designed to provide an adequate detention period to allow the heavier solids to settle out, and for the removal of surface scum and grease. The heavier solids which settle out to the bottom of the tank and surface scum are collected by a scraper mechanism and withdrawn to a sludge pit from where it is pumped to the primary digester.

The primary sedimentation tanks are designed to provide sufficient detention to allow removal of 30-35% of the heavy organic material.

The settled waste water flows over the effluent weirs and discharges to the aeration tanks.

AERATION

Settled sewage flows from the primary sedimentation tanks to the four aeration sections. There it is mixed with activated sludge which is returned from the final sedimentation tanks and aerated.

The aeration sections retain the sewage for 6 hours at a flow of 1.6 million gallongs per day. Air is supplied by three blowers with a total capacity of 1,440 cubic feet of air per minute.

FINAL SEDIMENTATION

The aerated mixed liquor from the aeration sections is retained in four final sedimentation tanks for approximately two hours at design flow. This allows the activated sludge to settle. It is collected from the bottoms of the tanks and returned to the aeration sections. (Excess activated sludge is returned to the primary sedimentation tanks and is pumped from there to the digesters.) The remaining liquid flows over the weirs of the final sedimentation tanks to the chlorine contact chambers.

DIGESTION

Sludge digestion in this plant is performed in two stages called primary and secondary digestion.

The sludge from the primary tanks is pumped, with excess activated sludge to the primary digester. In the absence of air, and in a regulated temperature of 90^{o} F., the decomposing or digestion process begins. Constant agitation within the tank insures overall treatment.

The raw sludge is broken down by anaerobic bacterial action and, when thoroughly digested, is a thick, dark, odourless liquid.

The secondary digester receives the digested material from the primary and completes the process. The secondary digester is not agitated but is allowed to be quiescent. The supernatant is decanted and returned to the treatment process.

Sludge gas, principally methane, formed during the process, is used as a fuel for the heat exchanger and boiler supplying heat to the digester and buildings. Oil is used as standby fuel.

CHLORINATION

From the final sedimentation tanks, the effluent flows to two chlorine contact chambers where it is chlorinated to reduce the bacterial count to within acceptable limits. It is then discharged to the creek.

Design–Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 16,000.

Design Plant Flow - 1,600,000 gallons per day.

Per Capita Flow - 100 gallons per day.

Five Day BOD -

Raw Sewage	-	200 PPM
Removal	-	90%

Suspended Solids -

Raw Sewage	-	220 PPM
Removal	-	95%

COARSE SCREEN

1 inch x 0.25 inches at approximately 3 inch centres.

AERATED GRIT TANK

Size - 15.5 ft. x 6 ft. x 9 ft. (SWD).

Volume - 837 cubic feet or 5,220 gallons.

Retention - 4.7 minutes at 1.6 MGD.

Channel - Grit decanting trough (baffled).
- 8.75 ft. x 3 ft. x 2.25 ft. (top of concrete).
- 5 round-the-end baffles and adjustable weir overflow.

SHREDDER

Barminutor - Chicago Pump Company Model B-18 inch.

FLOW DIVISION BOX

8 inch diameter pipe to 1951 section.

12 inch diameter pipe to 1955 section.

15 inch diameter pipe to 1957 section.

1951 PLANT

PRIMARY SEDIMENTATION TANK

Size - 16 ft. diameter x 10 ft. SWD.

Volume - 2010 cubic feet, or 12,550 gallons.

AERATION TANKS

Size - 2 each 58 ft. x 9 ft. x 9 ft. liquid depth.

Volume - 4700 cubic feet each or 58,600 gallons (total).

SECONDARY SEDIMENTATION TANK

Size - 19 ft. diameter x 10 ft. SWD.

Volume - 2835 cubic feet or 17,680 gallons.

1955 EXTENSION

PRIMARY SEDIMENTATION TANK

Size - 26 ft. diameter x 10 ft. SWD.

Volume - 5310 cubic feet or 33,100 gallons.

AERATION TANKS

Size - 2 each 81 ft. x 14.5 ft. x 10.25 ft. liquid depth.

Volume - 12,030 cubic feet each or 150,000 gallons (total).

SECONDARY SEDIMENTATION TANK

Size - 30 ft. diameter or 10 ft. SWD.

Volume - 7,060 cubic feet or 44,100 gallons.

CHLORINE CONTACT CHAMBER

Size - 25 ft. x 10 ft. x 8 ft. liquid depth.

Volume - 2,000 cubic feet or 12,500 gallons.

1957 EXTENSION

PRIMARY SEDIMENTATION TANK

Size - 2 each 26 ft. diameter x 9.7 ft. SWD.

Volume - 5,150 cubic feet each or 64,350 gallons (total).

AERATION TANKS

Size - 4 each 81 ft. x 14.5 ft. x 9.35 ft. SWD.

Volume - 10,980 cubic feet each or 274,000 gallons (total).

SECONDARY SEDIMENTATION TANK

Size - 2 each 30 ft. diameter x 9.67 ft. SWD.

Volume - 6,840 cubic feet each or 85,400 gallons (total).

CHLORINE CONTACT CHAMBER

Size - 25 ft. x 10 ft. x 8 ft. liquid depth.

Volume - 2,000 cubic feet or 12,500 gallons.

OVERALL PLANT

PRIMARY SEDIMENTATION TANKS

Volume - 12,550 (1) + 33,100 (2) + 64,350 (3&4) = 110,000 gallons.

Retention - 1.65 hours at 1.6 MGD.

Surface Settling Rate - 908 gallons per square ft. per day at 1.6 MGD.

Weir Overflow Rate - 4,880 gallons per lineal ft. of weir per day at 1.6 MGD.

AERATION TANKS

Volume - 58,600 (1) + 150,100 (2) + 274,000 (3&4)= 482,700gallons

Retention - 7.25 hours at 1.6 MGD (no return sludge).

- 5.9 hours at 1.6 MGD plus 25% return sludge.

SECONDARY SEDIMENTATION TANKS

Volume - 17,680 (1) + 44,100 (2) + 85,400 (3&4) = 147,180 gallons.

Retention - 2.21 hours at 1.6 MGD or 1.77 hours at 2.0 MGD.

Surface Settling Rate - 667 gallons per square ft. per day at 1.6 MGD.

Weir Overflow Rate - 4,120 gallons per lineal ft. of weir per day at 1.6 MGD.

CHLORINE CONTACT CHAMBERS

Volume - 12,500 (2) + 12,500 (3&4) = 25,000 gallons.

Retention - 22.5 minutes at 1.6 MGD.

SLUDGE DIGESTERS

Size (1951) - 30 ft. diameter x 19 ft. SWD.

Volume - 13,430 cubic feet.

Size (1957) - 50 ft. diameter x 20 ft. SWD.

Volume - 39,200 cubic feet.

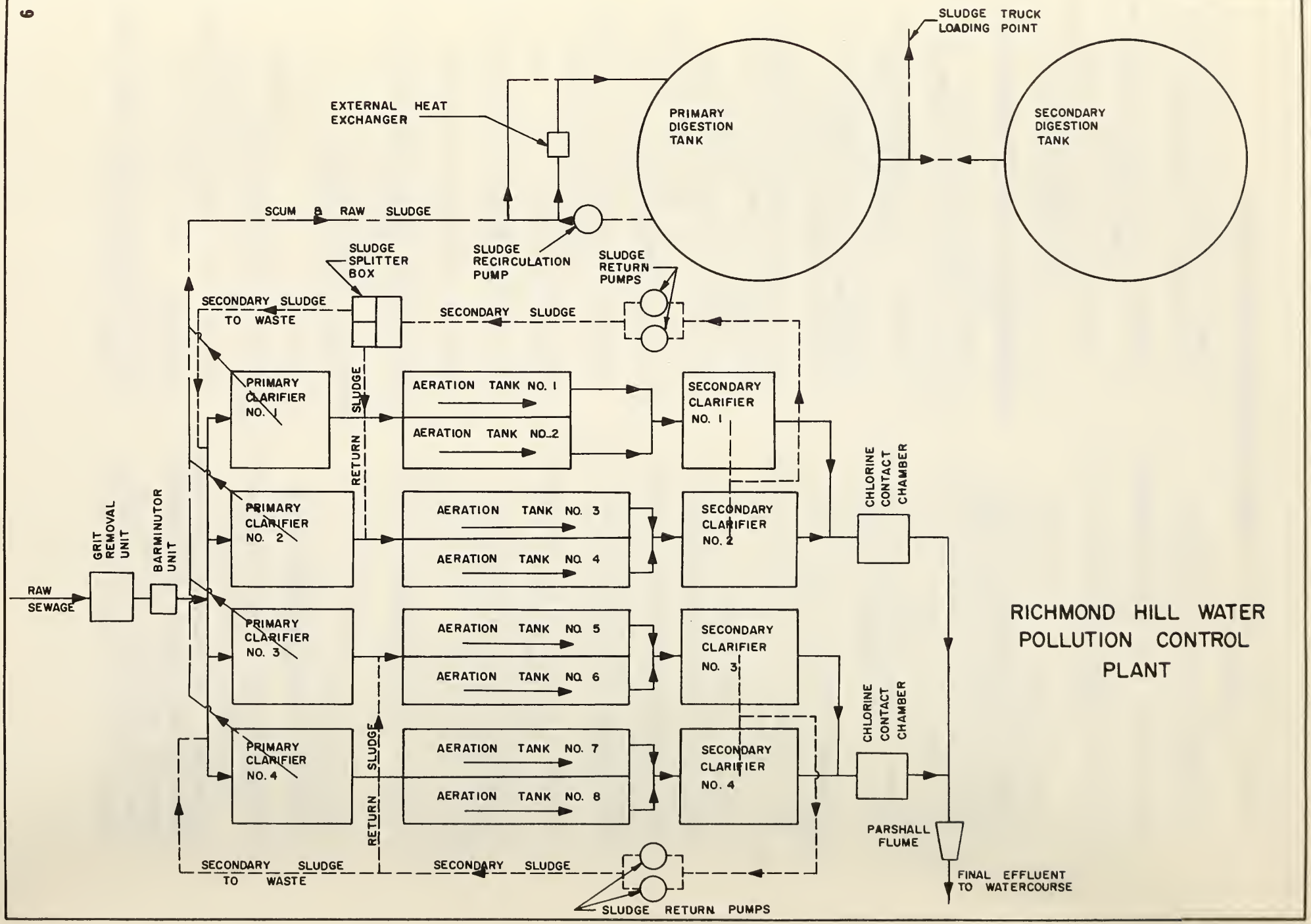
TOTAL

Volume - 52,630 cubic feet.

Capacity - 3.28 cubic feet per capita.

OUTFALL

30 inch diameter concrete outfall sewer to German Mills Creek.



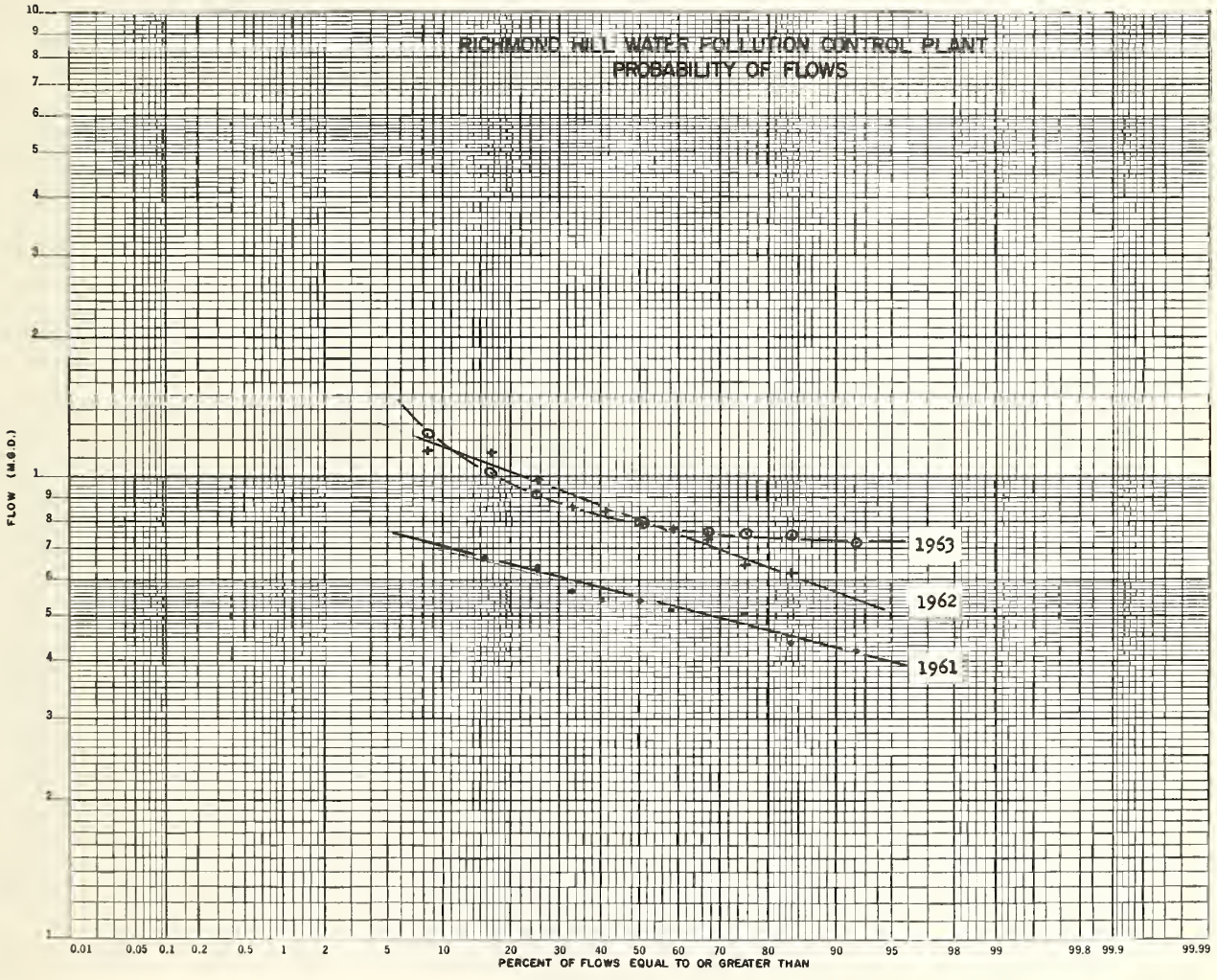
RICHMOND HILL WATER POLLUTION CONTROL PLANT

Process Data

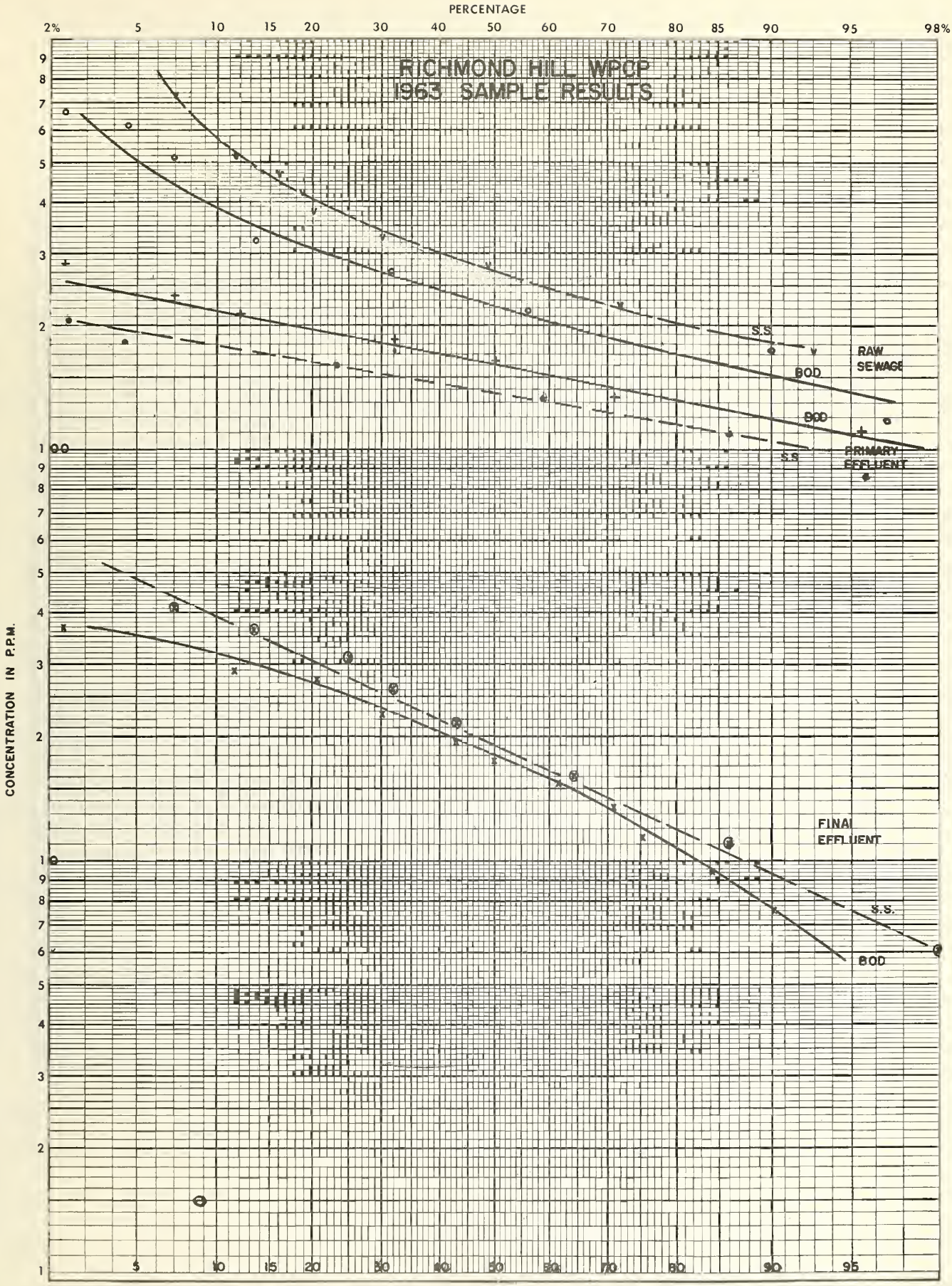
FLOW

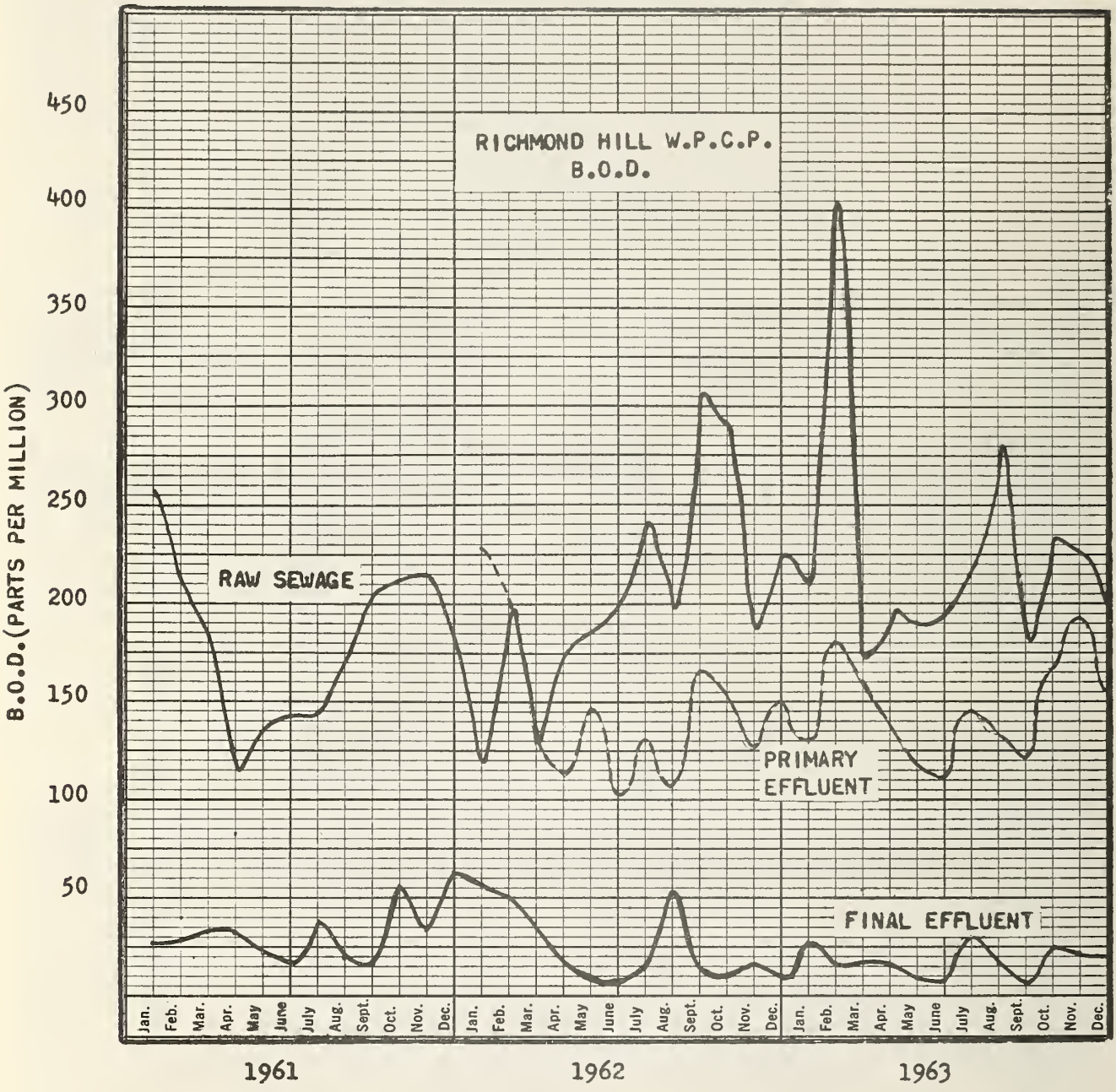
As will be noted from the accompanying charts and graphs, the average daily flow and total flow for the year were slightly higher (4.5%) than the 1962 flows. During 1963, the average daily flow was 0.905 million gallons per day as compared to 0.866 million gallons per day in 1962. During the past year, 331.36 million gallons of raw sewage received complete treatment.

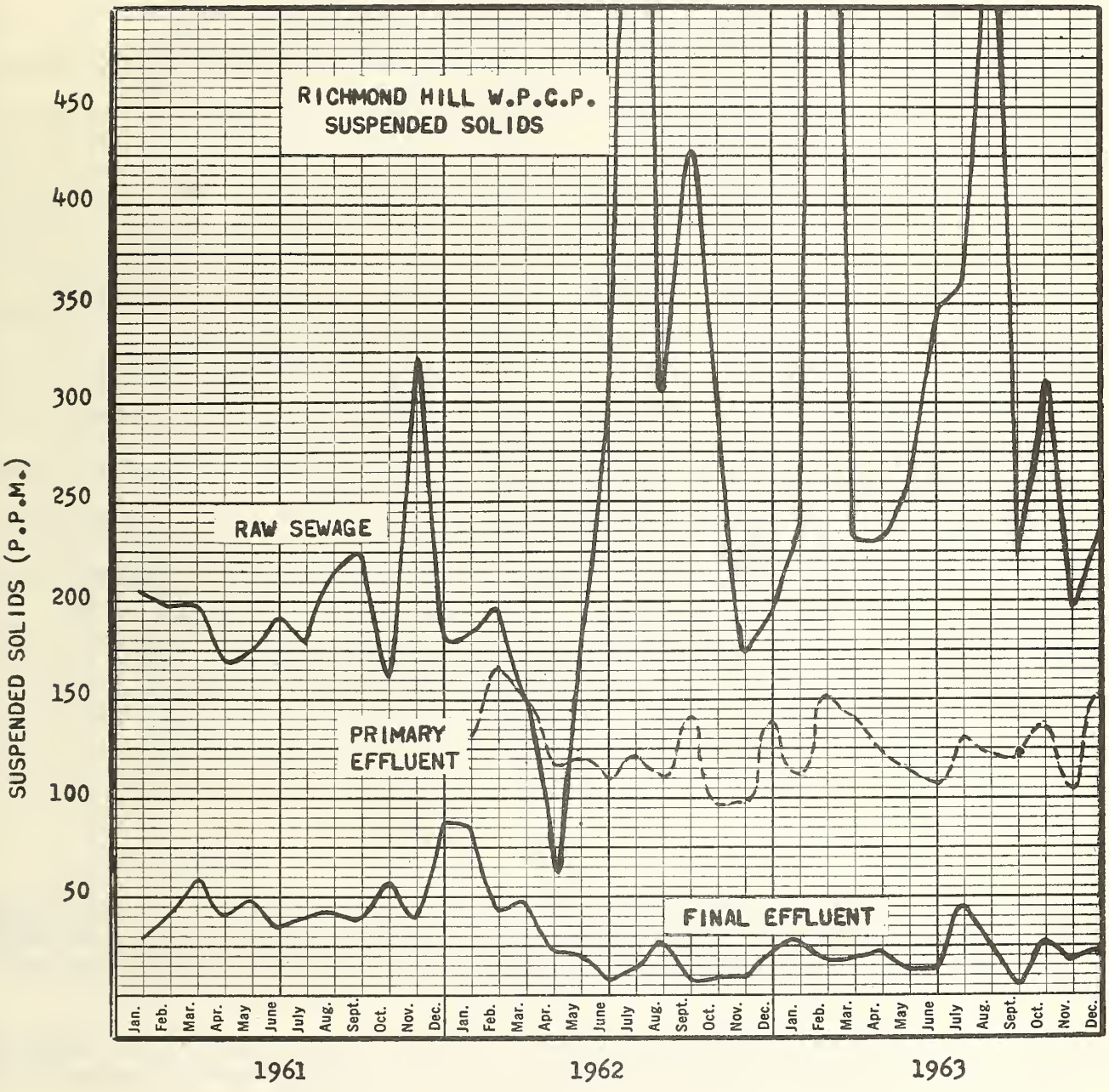
The maximum 24 hour flow in the past year was in excess of 3.0 million gallons. The exact flow was not recorded due to the limitation of the recording device, however, flows in excess of 3.0 million gallons were experienced on numerous occasions.



RICHMOND HILL W.P.C.P.
AVERAGE DAILY FLOWS
DAILY FLOWS (M.G.D.)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
1959
1960
1961
1962
1963
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.


RICHMOND HILL WPCP
1963 SAMPLE RESULTS
PERCENTAGE
2%
5
10
15
20
30
40
50
60
70
80
85
90
95
98%
S.S.
RAW SEWAGE
BOD
BOD
PRIMARY EFFLUENT
S.S.
FINAL EFFLUENT
S.S.
BOD
CONCENTRATION IN P.P.M.
PERCENT SAMPLES EQUAL TO OR GREATER THAN


RICHMOND HILL W.P.C.P.
B.O.D.
B.O.D.(PARTS PER MILLION)
450
400
350
300
250
200
150
100
50
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963


RICHMOND HILL W.P.C.P.
SUSPENDED SOLIDS
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
SUSPENDED SOLIDS (P.P.M.)
450
400
350
300
250
200
150
100
50
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963

GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	210	27	87.1	28.2	238	28	88.2	30.0	-
FEB.	406	16	96.0	44.06	485	18	96.0	52.8	-
MAR.	172	17	90.0	31.5	230	18	92.0	43.2	-
APR.	196	16	92.0	28.1	230	22	90.5	32.4	-
MAY	189	9	95.0	35.5	259	12	95.5	48.7	-
JUNE	192	8	96.0	23.5	347	12	96.5	42.9	-
JULY	218	31	85.5	22.3	361	45	87.5	37.7	13
AUG.	282	16	94.5	32.2	588	30	95.0	67.5	49
SEPT.	178	5.6	96.5	19.6	221	5	97.5	24.6	-
OCT.	233	25	89.0	24.4	312	27	91.5	33.5	-
NOV.	225	23	89.5	26.5	196	19	90.5	23.2	45
DEC.	195	20	89.5	19.8	237	24	90.0	24.2	33
TOTAL				335.66				460.7	140
AVG.	225	18	92.0	27.97	309	22	92.8	38.4	12

COMMENTS

An average loading of 225 PPM BOD and 309 PPM S. S. was experienced in the raw sewage in 1963. The average BOD in the effluent of 18 PPM was slightly higher than the OWRC objective of 15 PPM. The final effluent suspended solids of 22 PPM was also in excess of the OWRC objective of 15 PPM.

The efficiencies obtained, 92 percent for BOD removal and 92.8 percent for suspended solids, are satisfactory. The grit removed per million gallons of sewage treated, 0.42 cubic feet, is lower than that for similar installations in North America.

DIGESTER OPERATION

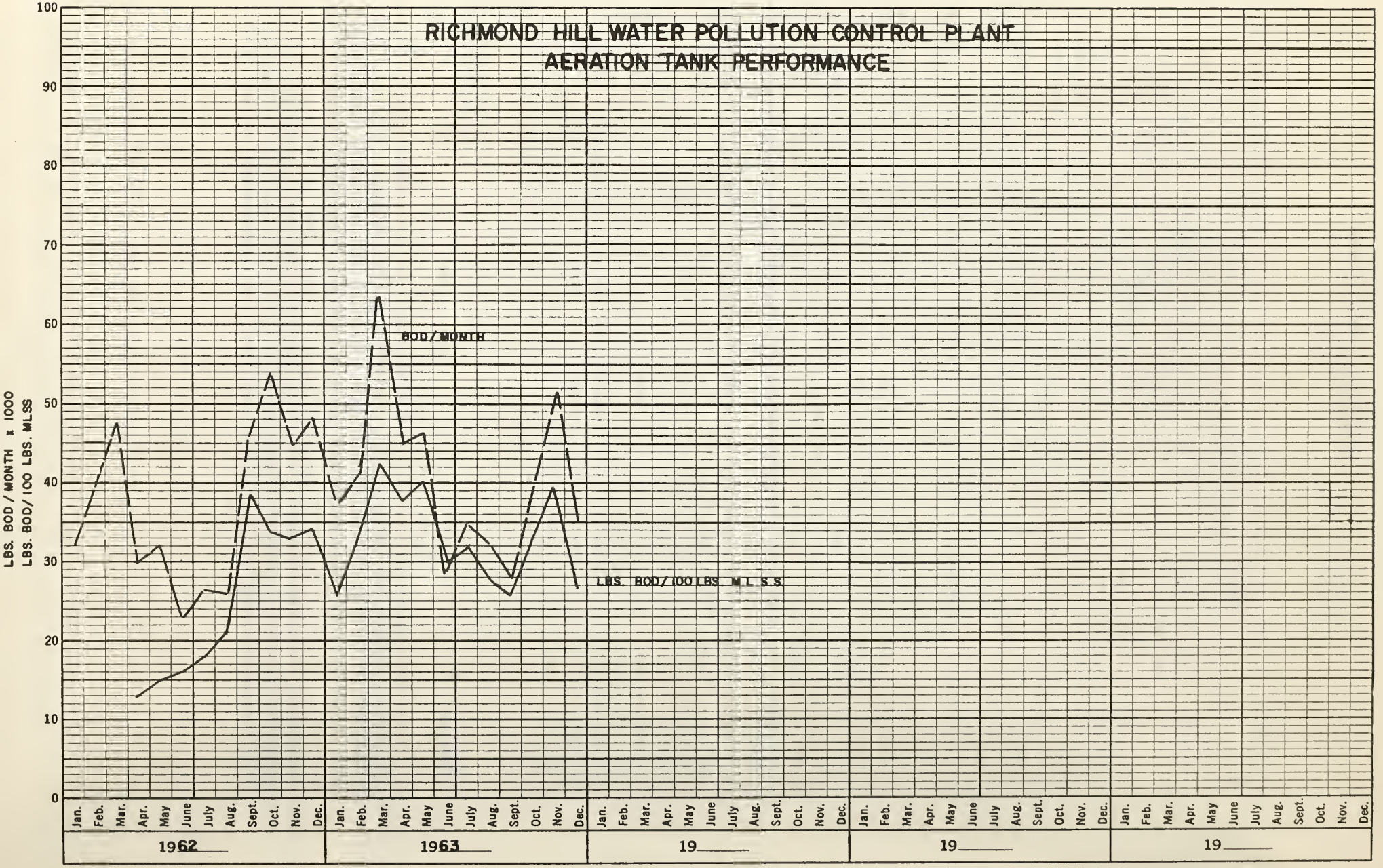
MONTH	SLUDGE TO DIGESTERS			% VOL.MAT IN DIGESTED SLUDGE	GAS PRODUCED 1000'S CU. FT.	SLUDGE FROM DIGESTER 1000'S GALS
	1000'S GALLONS	% SOLIDS	% VOL. MAT.			
JAN.	389					
FEB.	239					
MAR.	186					
APR.	129			2.49		
MAY.	210					
JUNE	219					
JULY	228	2.80				
AUG.	150	3.96				
SEPT.	248	3.76				
OCT.	296	3.75				
NOV.	238	3.22				
DEC.	182	3.02				
TOTAL	2,714					
AVG.	226	3.42				

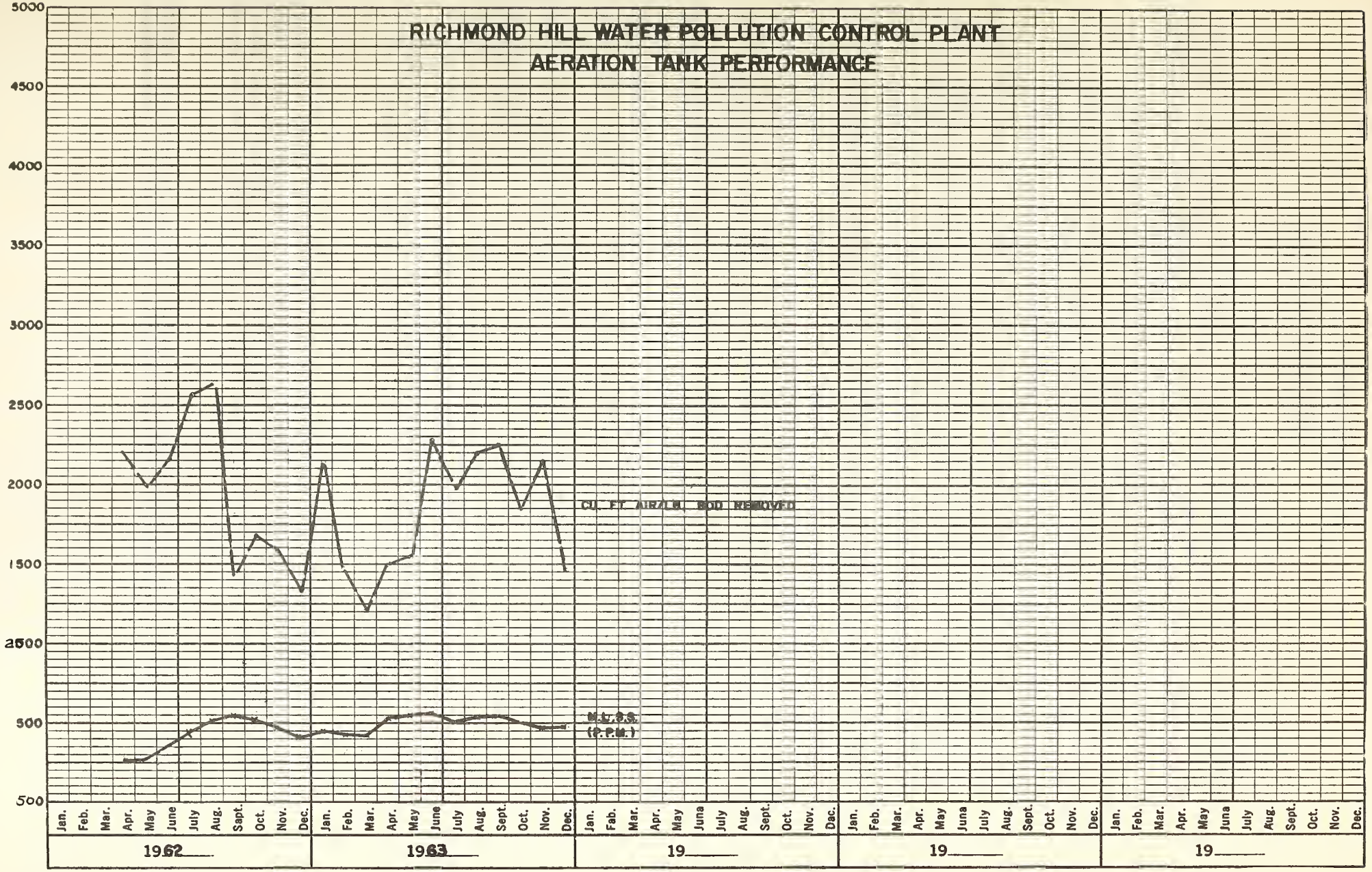
* VOL. MAT. - VOLATILE MATTER

COMMENTS

During the year 1963, a total of 2.713 million gallons of raw sludge was pumped to the digesters. At an average concentration of 3.42% solids, this represents a total of 934,000 pounds.

The quantity of sludge removed from the digesters during the year was 1,359 million gallons or 49.8% of the total sludge to the digesters. Sludge disposal at the Richmond Hill plant is by means of truck haulage.


RICHMOND HILL WATER POLLUTION CONTROL PLANT
AERATION TANK PERFORMANCE
LBS. BOD / MONTH x 1000
LBS. BOD/ 100 LBS. MLSS
100
90
80
70
60
50
40
30
20
10
0
BOD / MONTH
LBS. BOD / 100 LBS. M.L.S.S.
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1962
1963
19____
19____
19____


RICHMOND HILL WATER POLLUTION CONTROL PLANT
AERATION TANK PERFORMANCE
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
CU. FT. AIR/LB. BOD REMOVED
M.L.V.S.S. (P.P.M.)
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1962
1963
19____
19____
19____

AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	130	1508	26	2152
FEBRUARY	181	1579	32	1478
MARCH	159	1520	42	1195
APRIL	144	1351	38	1501
MAY	117	1234	40	1536
JUNE	110	1197	30	2262
JULY	146	1346	32	1955
AUGUST	134	1291	28	2192
SEPTEMBER	122	1243	26	2235
OCTOBER	168	1309	33	1862
NOVEMBER	194	1451	39	1365
DECEMBER	154	1397	27	2068
TOTAL				
AVERAGE	147	1368	33	1817

COMMENTS

An examination of the above table would seem to indicate that there is an adequate supply of air available at the plant. This is true when considering the flows over a 24 hour period, however, for shorter periods such as the 6 hours during the day when peak flows are experienced, a sufficient reserve of air is not available to satisfy the air requirements.

Measures to correct this situation will be taken in 1964 by having spare diffusers available to allow for replacement of plugged diffusers while they are being cleaned.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	28.579	576.8	2.0
FEBRUARY	22.596	806.8	2.8
MARCH	40.706	1080.6	2.7
APRIL	31.181	1071.3	3.4
MAY	39.467	906.8	2.3
JUNE	25.590	1182.6	4.6
JULY	23.888	2897.0	12.0
AUGUST	24.186	2353.0	9.7
SEPTEMBER	22.800	2458.4	10.8
OCTOBER	23.488	2143.9	9.1
NOVEMBER	26.205	1572.7	6.0
DECEMBER	22.677	1700.0	7.5
TOTAL	331.363	187,499	
AVERAGE	27.614	1562.4	5.8

COMMENTS

Chlorination was carried out throughout the year to reduce the bacterial count of the plant effluent. During the year, 187,499 pounds of chlorine were required to treat 331.36 million gallons. This represents an average dosage of 5.8 PPM.

1963

PLANT — **Total Operating Costs** — **MONTHLY**

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	4240.02	1329.06	343.22	112.82	436.56	1915.63	16.75	--	15.90	70.68	
FEB	2424.39	1329.06	233.56	91.90	411.85	(700.00)	134.89	--	660.80	262.33	
MARCH	4069.42	1329.06	272.40	613.79	428.42	593.61	53.90	--	237.45	540.99	
APRIL	2469.77	1547.21	233.52	328.38	413.28	(347.94)	70.08	--	125.71	99.58	
MAY	2775.14	1381.24	270.80		390.05	233.82	23.16	--	203.61	272.46	
JUNE	3308.32	1385.84	307.96	316.22	401.32	574.03	191.34	--	58.33	73.28	
JULY	4174.40	2064.31	319.84	12.60	359.65	(187.42)	42.63	--	--	1622.79	
AUG	3310.54	1393.96	216.96	7.13	386.59	(125.97)	239.38	89.29	212.46	890.74	
SEPT	4296.13	1465.16	249.82	--	362.34	894.71	88.77	--	277.54	957.79	
OCT	3258.13	1369.74	521.52	71.02	388.46	614.88	71.36	--	101.78	119.42	
NOV	3901.87	1369.74	401.16	39.32	417.64	(1404.24)	49.12	5.83	252.06	2771.21	
DEC	4725.63	2351.11	427.72	24.61	420.79	575.01	65.89	10.23	124.73	725.54	
TOTAL	42,953.81	18315.49	3798.48	1617.59	4816.95	2635.55	1047.27	105.35	2270.37	8346.76	

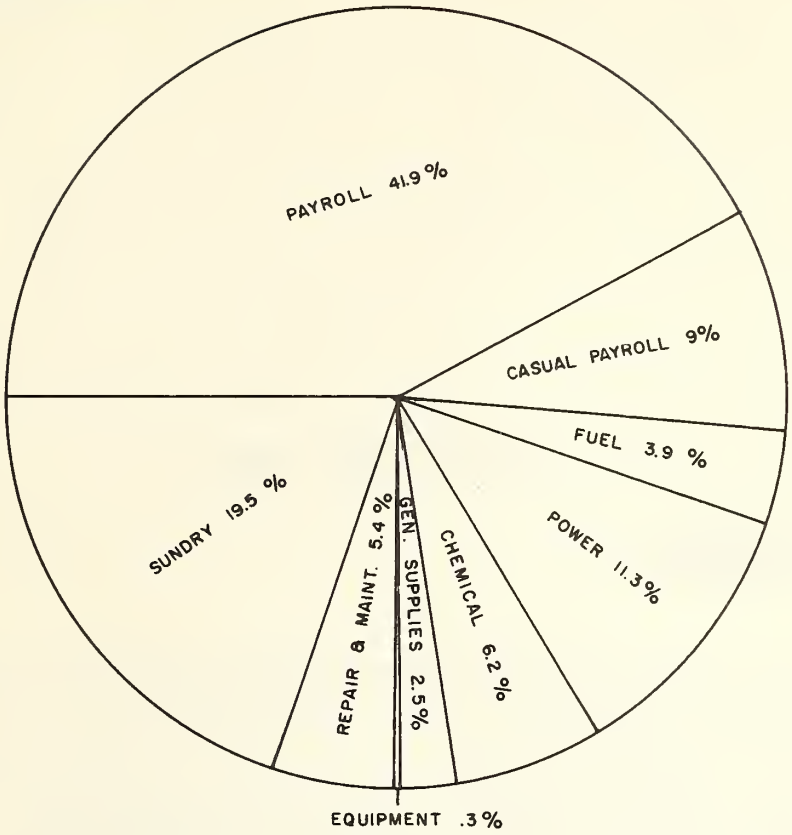
PLANT — **YEARLY**

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR
1961	205.53	44,475	216.50	
1962	316.02	44,420	140.50	
1963	331.36	42,954	129.50	2.32

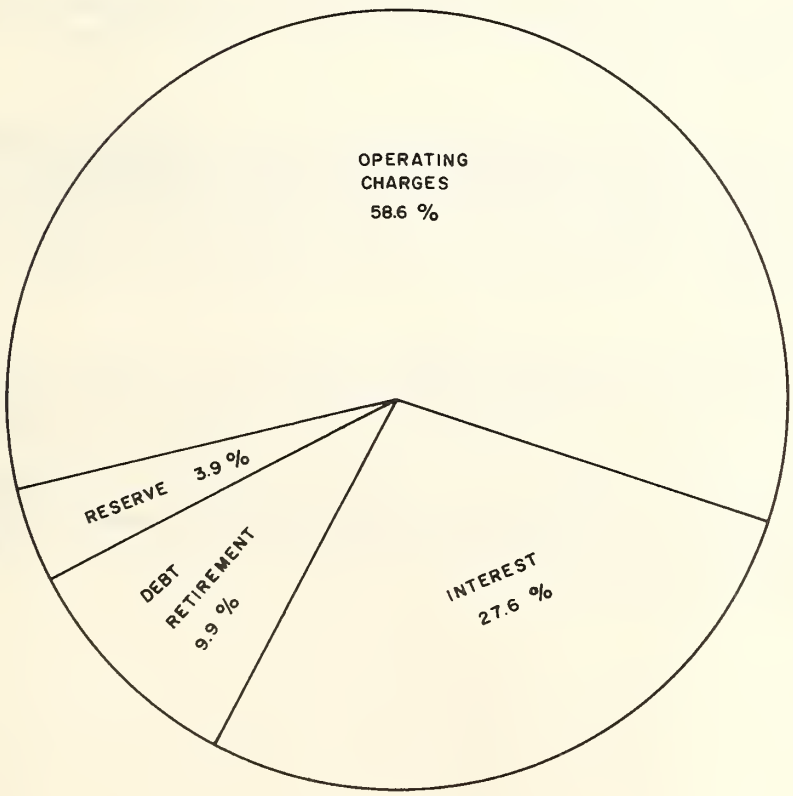
OPERATING COST PER CAPITA BASED ON PRESENT POPULATION OF 18,606

RICHMOND HILL

1963 OPERATING COSTS



TOTAL COSTS



SUMMARY

This report has given in detail significant data on the operation of the various treatment units at the Richmond Hill Sewage Treatment Plant.

With an average daily flow of 0.905 million gallons in 1963, the plant is below its design capacity of 1.6 million gallons per day. Fluctuations in flow, however, resulting in higher flows during the day, have taxed the air capacity of the plant, with the result that adequate air is not available at all times.

During 1964, additional diffusers will be purchased to allow continued operation of all aeration tanks while plugged diffusers are removed and cleaned.

In 1963, various odour complaints were received and investigated. It was established that the main source of these odours could not be directly attributed to the operation of the plant, but were the result of low flows during the night and weekends. The sewage lying in the mains for excessive periods was going stale and arriving at the plant in a near septic condition.

Pre-chlorination of the pumping stations was carried out on a trail basis in 1963 and encouraging results obtained. As a result, permanent chlorination of these pumping stations will be undertaken in 1964.

The operating cost for the plant during 1963 was slightly less than in 1961 and 1962. The cost per million gallons treated, however, was considerably less than that for 1961 and 1962 and this is the result of higher flows being treated.

Total 1963 Costs

The total cost to the municipality during 1963 was as follows:

Operating	$ 42,953.81
Debt Retirement	$ 7,253.00
Reserve	$ 2,982.00
Interest	$ 20,247.56
TOTAL	$ 73,436.37

On the basis of the present population of 18,606, the total cost of the Richmond Hill plant was approximately $3.95 per person.

On December 31st, 1963, there was a total of $18,381.90 in the Reserve Fund.

AUG 6 1971

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY ST. TORONTO 5